Existence Results for Classes of Steady State Reaction Diffusion Equations

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Abstract: In this talk, via the method of sub-super solutions, we will review existence results for positive solutions to steady state reaction diffusion equations of the form $-\Delta u = \lambda f(u)$ in Ω, with $u = 0$ on the boundary, where λ is a positive parameter, Ω is a bounded domain with smooth boundary, Δ is the Laplacian operator, and $f : (0, \infty) \to \mathbb{R}$ is a C^1 increasing function such that $\lim_{s\to\infty} \frac{f(s)}{s} = 0$. We will discuss the cases when $f(0) > 0$ (positone), $f(0) = 0$, $f'(0) < 0$ (semipositone), and $\lim_{s\to 0^+} f(s) = -\infty$ (infinite semipositone).